



Armed Forces College of Medicine

AFCM



Wrist & hand joints

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Ass. Professor of Anatomy

INTENDED LEARNING OBJECTIVES (ILO)



By the end of this lecture the student will be able to:

- 1. Describe type, articular surfaces, fibrous capsule, synovial membrane, ligaments, movements, arterial & nerve supply of wrist joint**
- 2. Identify type and movements of small joints of hand.**

What do you see ?



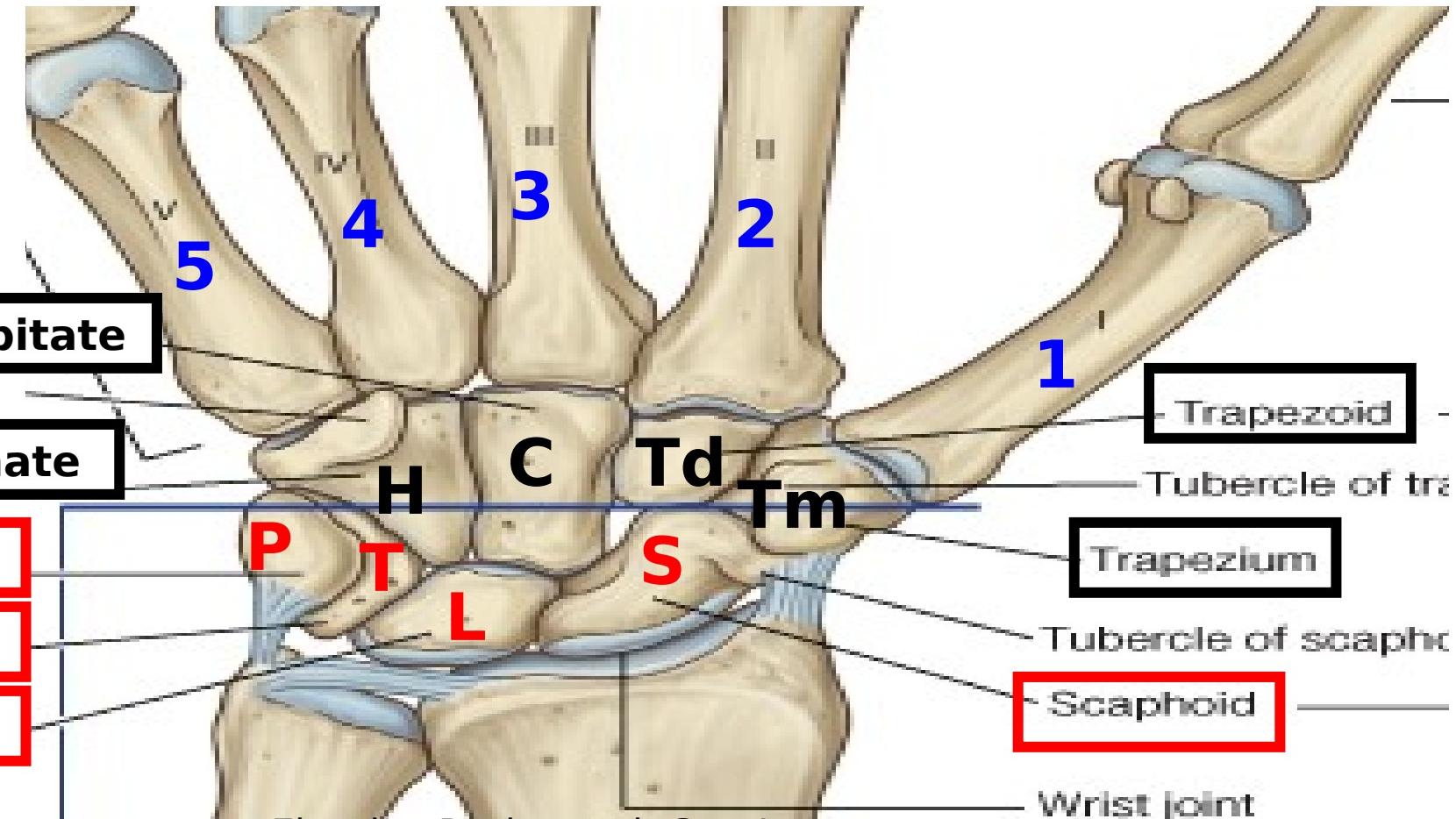
Wrist Joint



Carpal & metacarpal bones

Carpal bones are arranged in 2 rows: Proximal (4) & distal (4).

Metacarpal bones are numbered 1-5 from lat. to med.

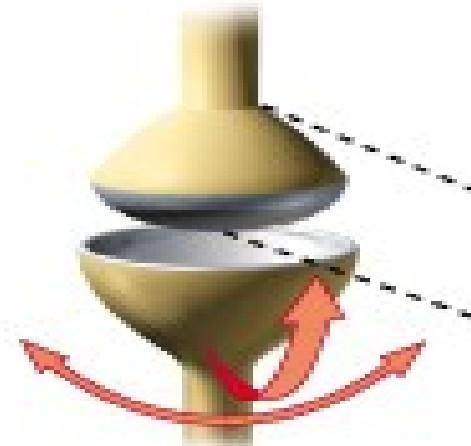


Elsevier. Drake et al: Gray's anatomy for student- www.
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Articular surfaces of wrist joint

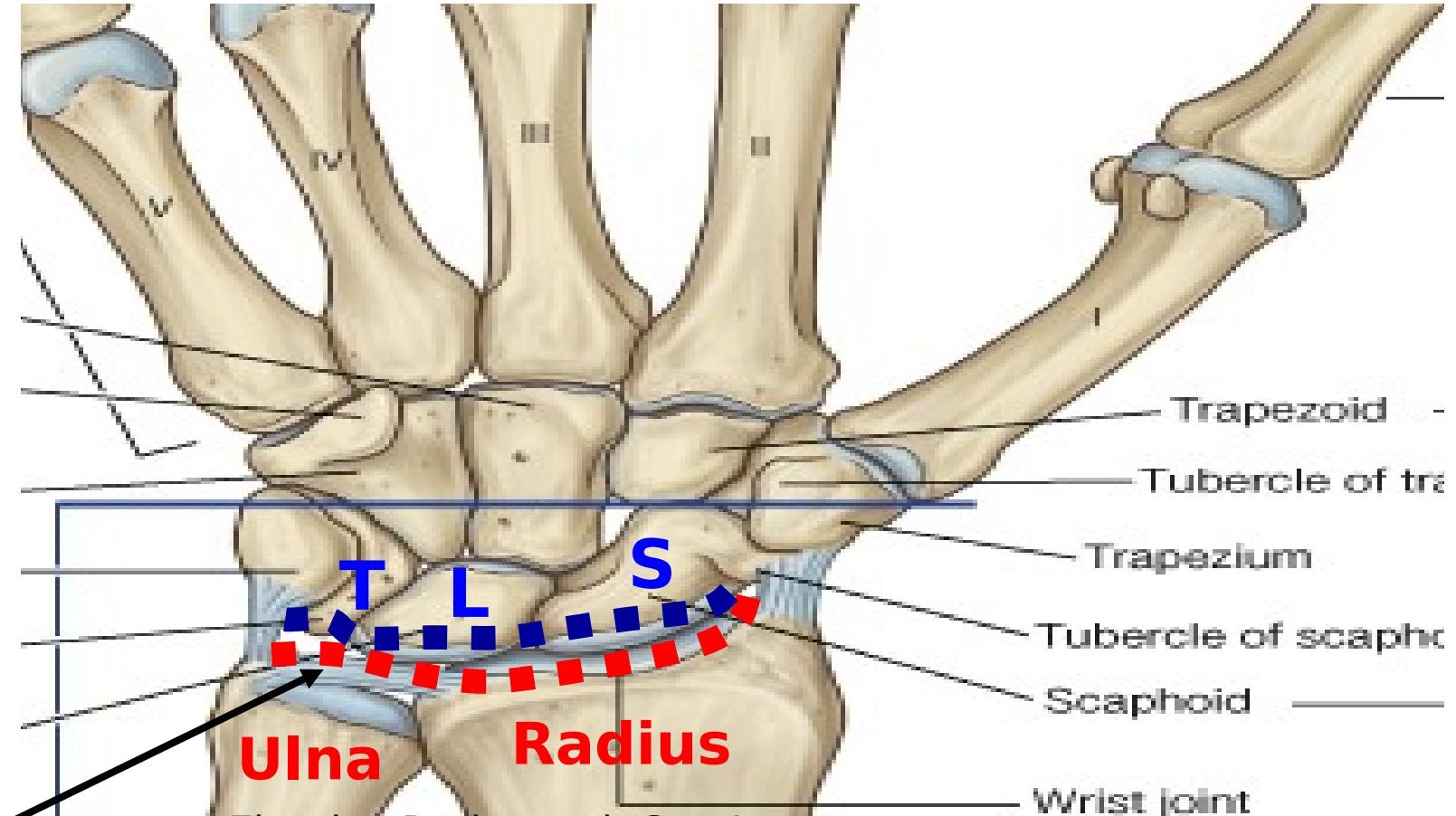


**Type:
Ellipsoid**



Articular disc

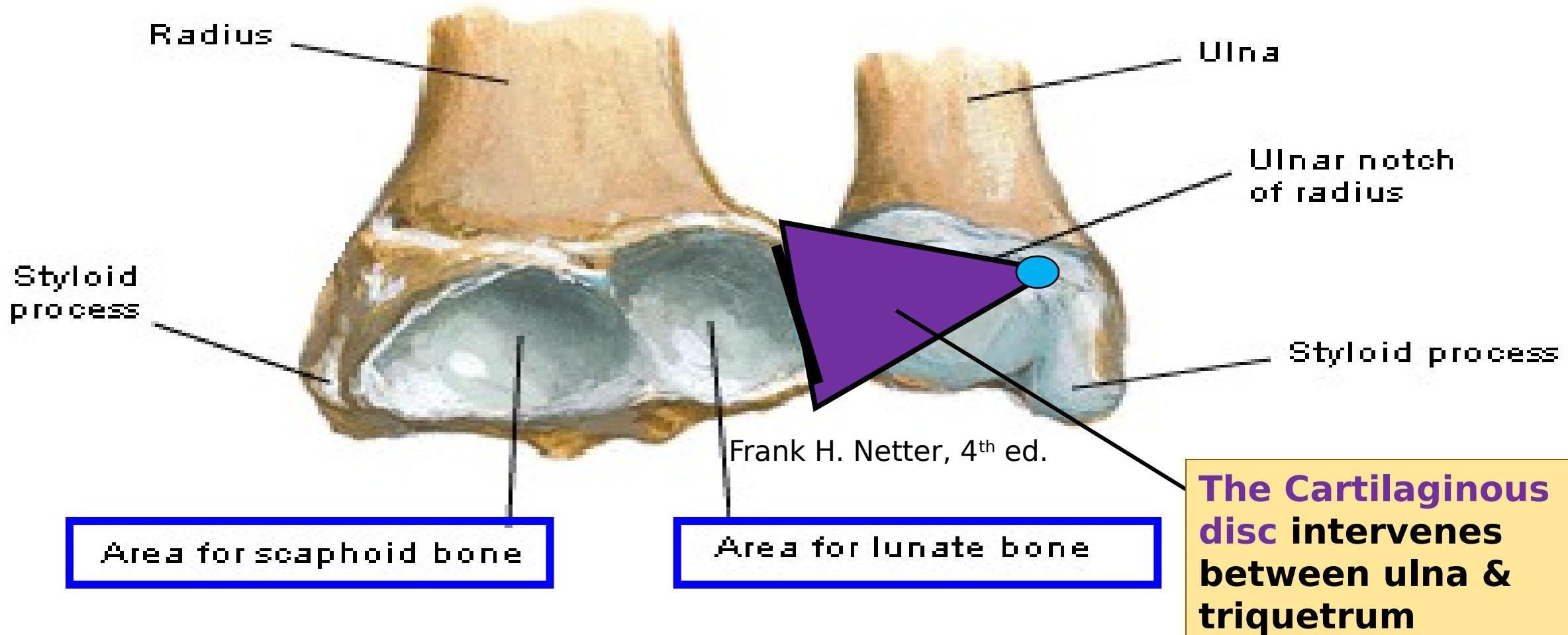
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Articular surfaces & cartilaginous disc of wrist joint



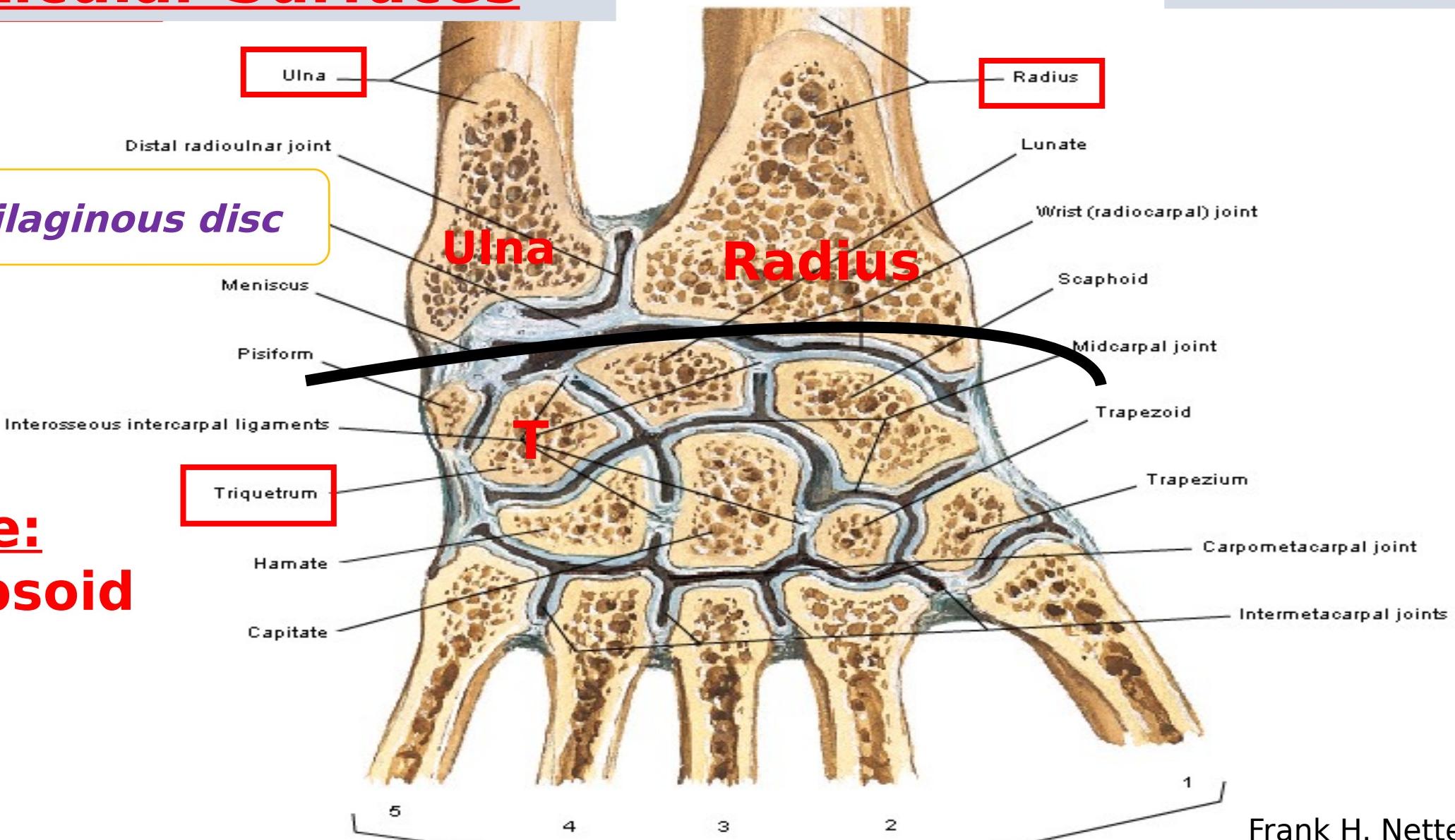
It is attached to inf. surface of ulna (in the groove bet. Head & styloid process) & on the radius (inf. border of ulnar notch)

Articular Surfaces

Cut Section

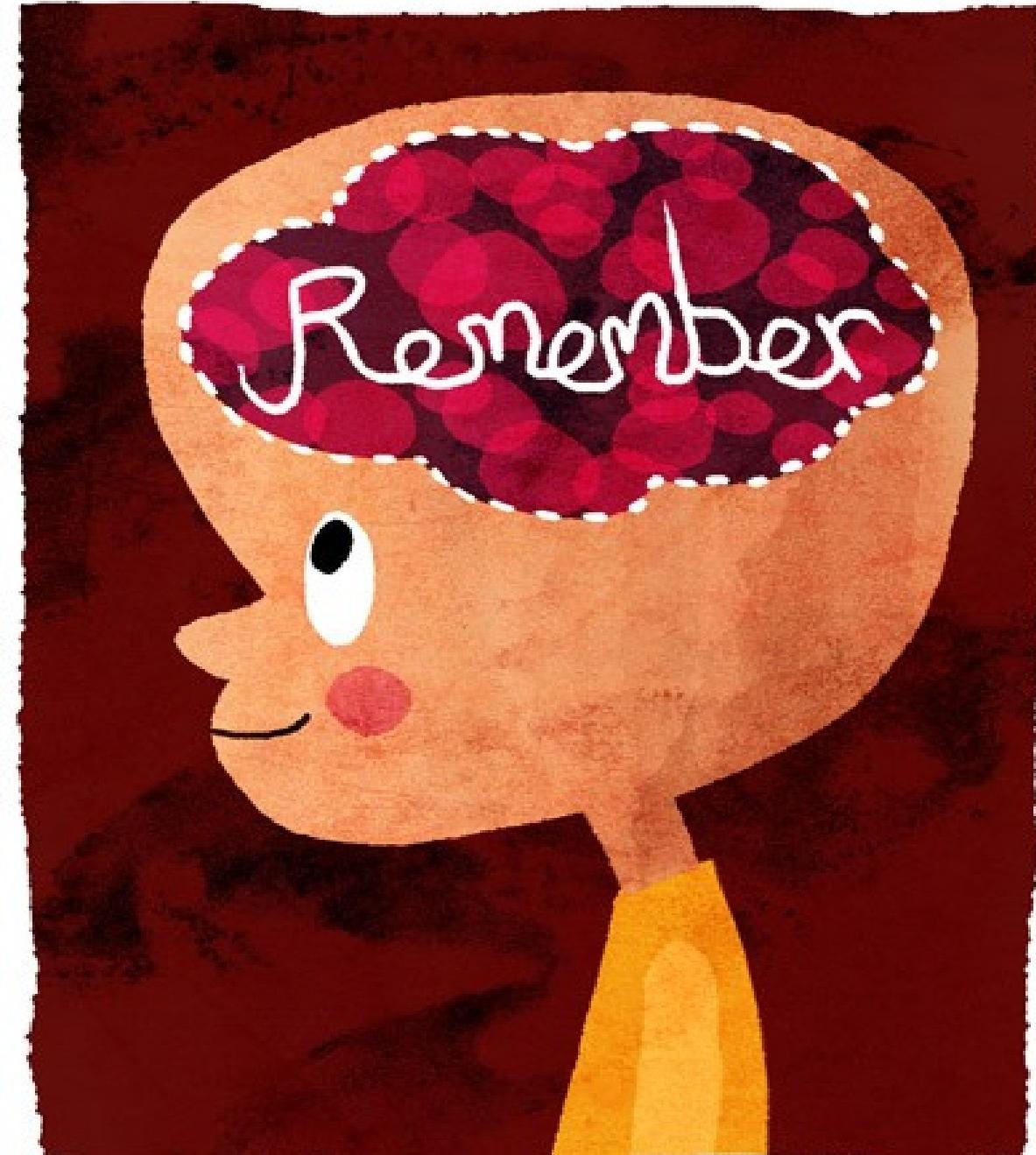
Cartilaginous disc

**Type:
Ellipsoid**

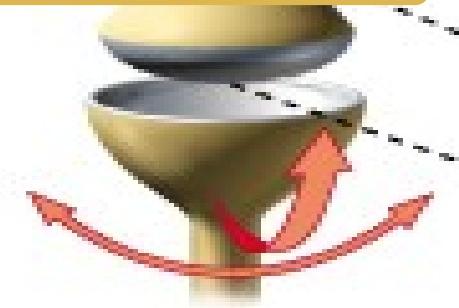


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- Ulna does not share in the wrist joint. That is why this joint is called the **radiocarpal joint**. Head of ulna is separated from the carpal bones by the triangular articular disc



Wrist (Radio-carpal) joint



- **Type:** Synovial (Ellipsoid).
- **Articular Surfaces:**
 - 1- **Proximally:** Lower end of radius & cartilaginous disc.
 - 2- **Distally:** Scaphoid, lunate & triquetrum.
- **Capsule:** attached to the margin of the articular surfaces.
- **Synovial membrane:** Lines the inner surface of the capsule.

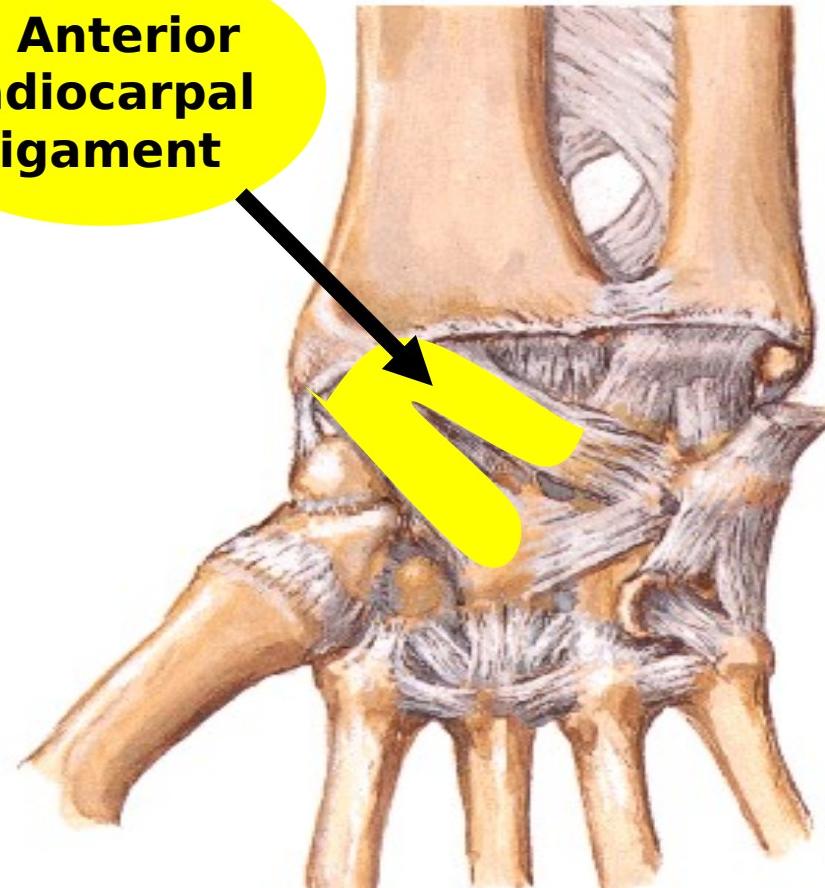


Ligaments of wrist joint

Ligaments of Wrist

Flexor Retinaculum Removed - Palmar View

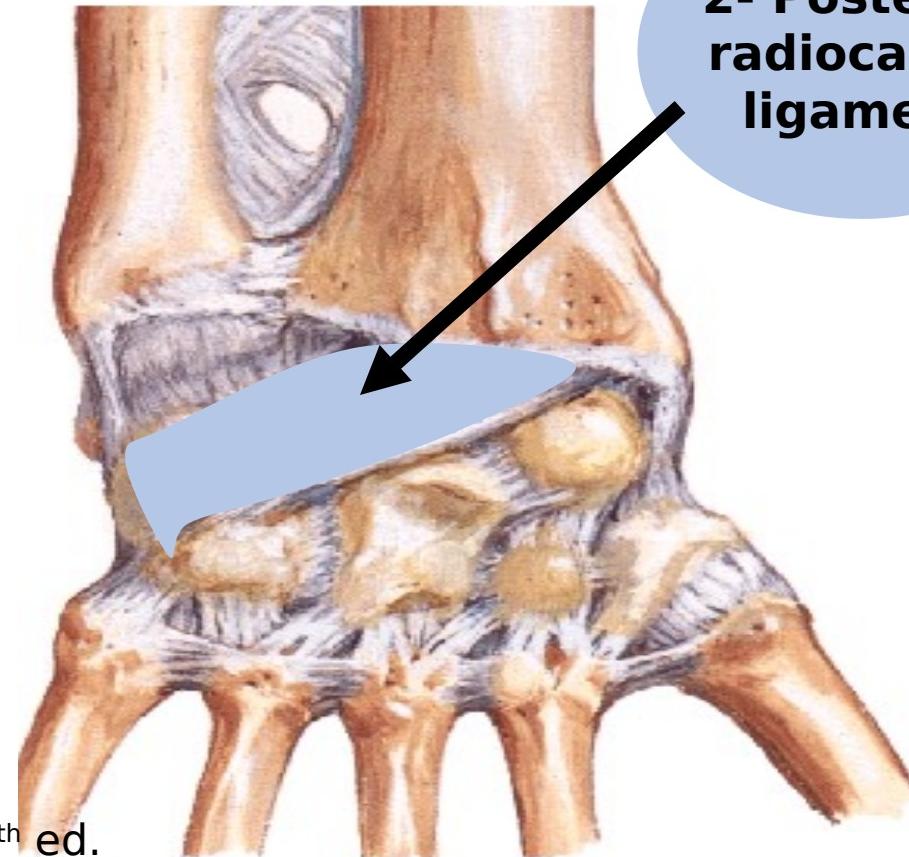
1- Anterior
radiocarpal
ligament



Ligaments of Wrist

Posterior [Dorsal] View

2- Posterior
radiocarpal
ligament

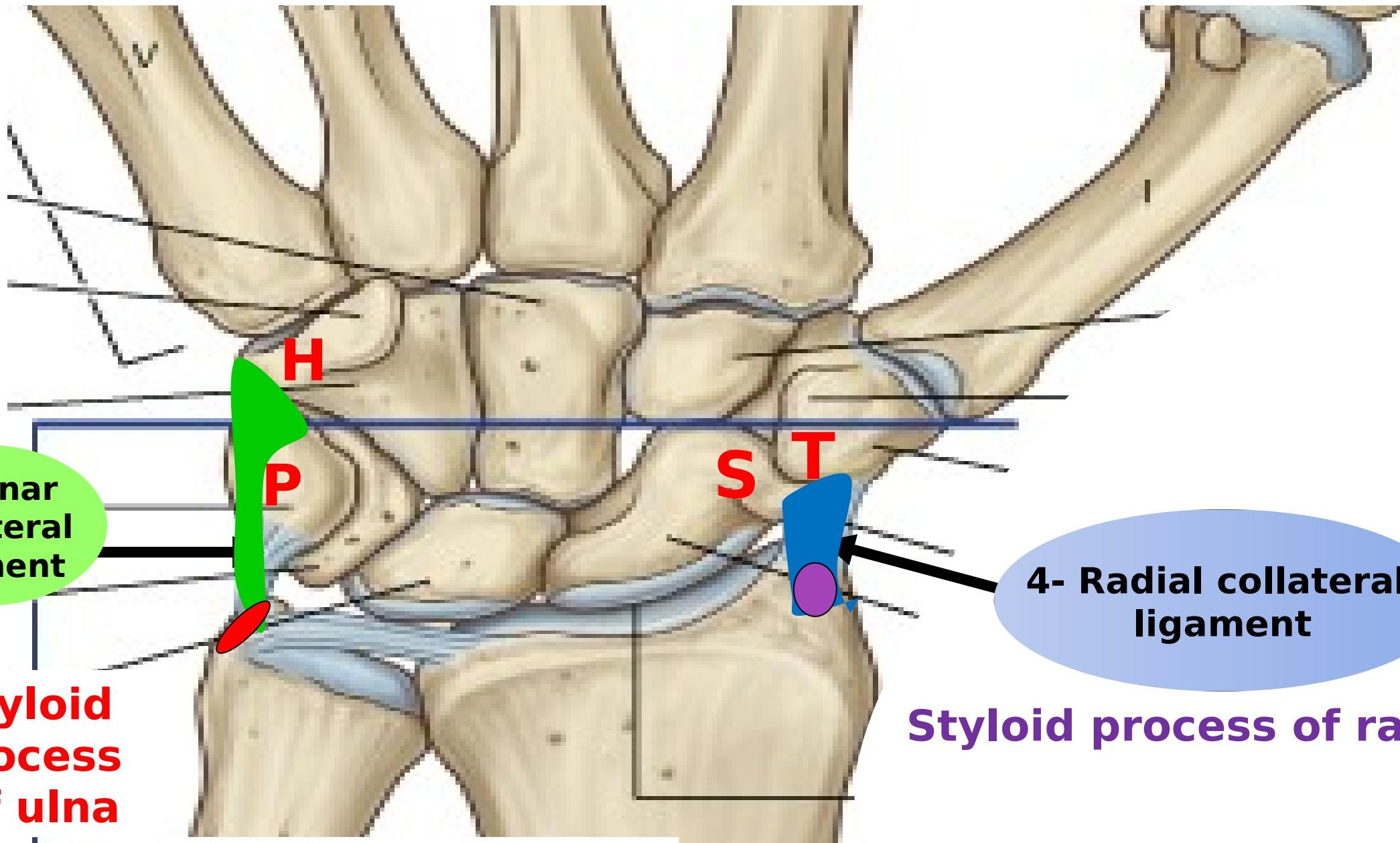


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3- Ulnar
Collateral
ligament

**Styloid
process
of ulna**

4- Radial collateral
ligament

Styloid process of radius

Ligaments of wrist joint



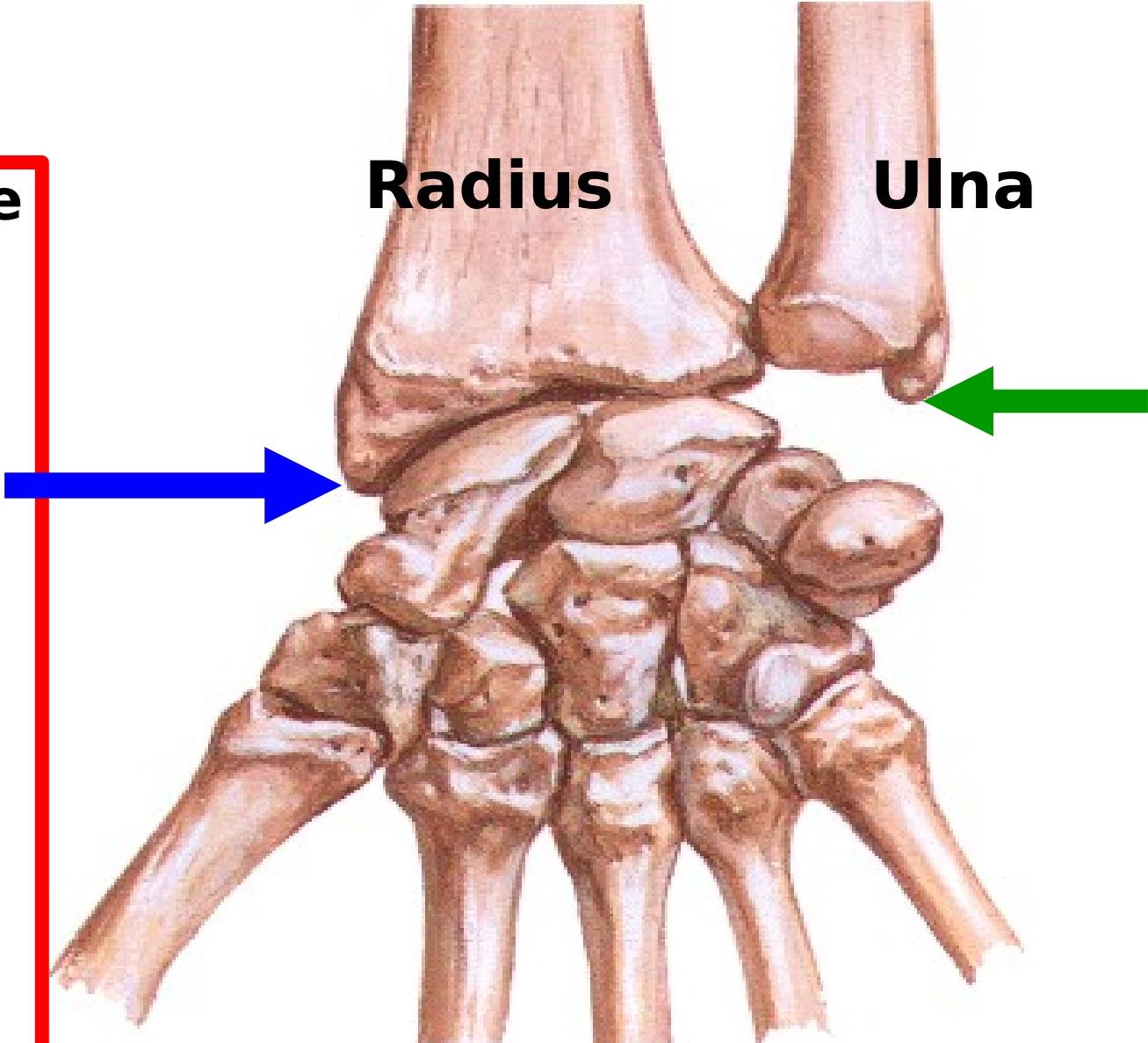
- 1) Ant. radio-carpal lig. (on the ant. surface of the joint).**
- 2) Post. radio-carpal lig. (on the post. surface of the joint).**
- 3) Ulnar collateral lig. (between styloid process of ulna & pisiform + hamate).**
- 4) Radial collateral lig. (between styloid process of radius & scaphoid + trapezium).**

Movements of wrist joint



- **Flexion**
- **Extension**
- **Adduction**
- **Abduction**
- **Circumduction**
- **No rotation (compensated by pronation & supination of forearm)**

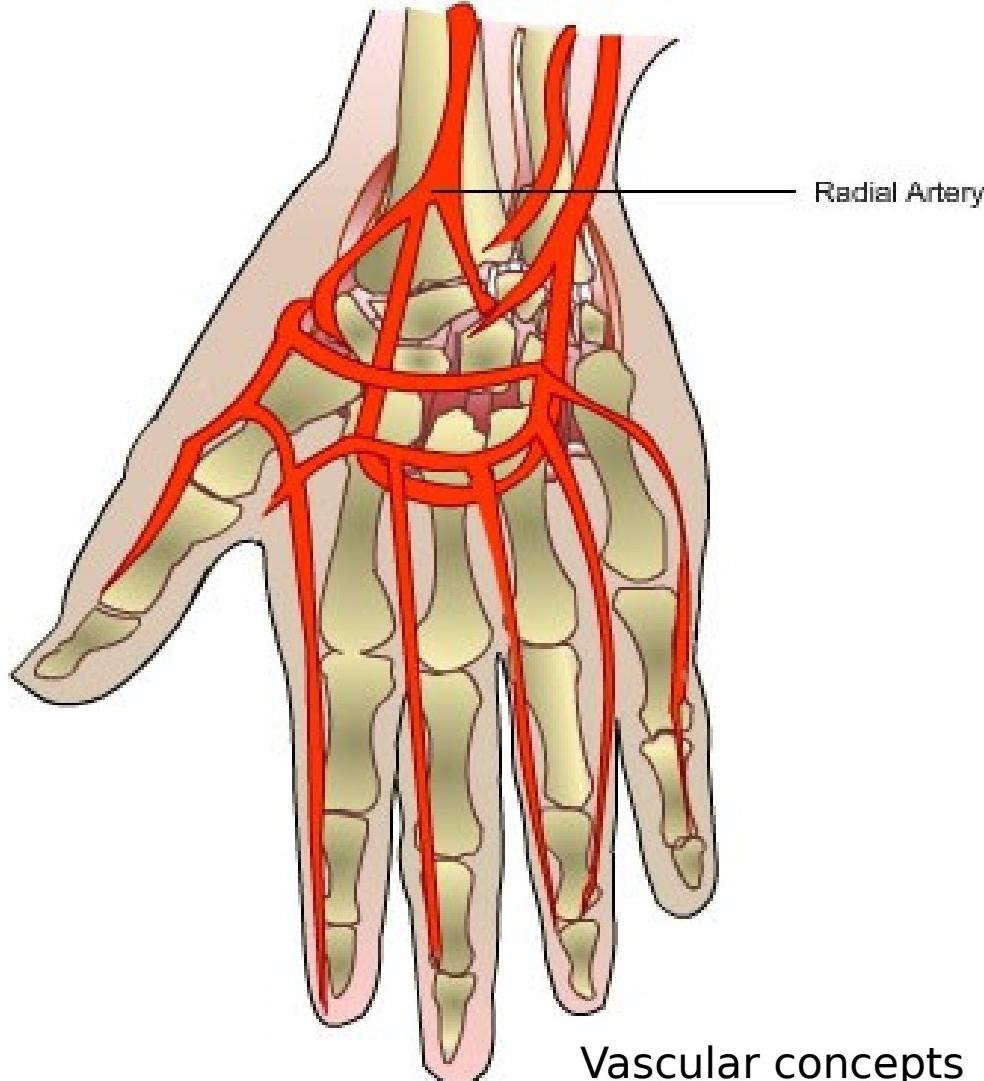
- Is the range of **adduction** of the hand at the wrist greater or lesser than the range of **abduction** and WHY???
- **ADDITION IS GREATER THAN ABDUCTION**
- Because the styloid process of **radius** is lower by 1 cm than the styloid process of **ulna**



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Arterial supply

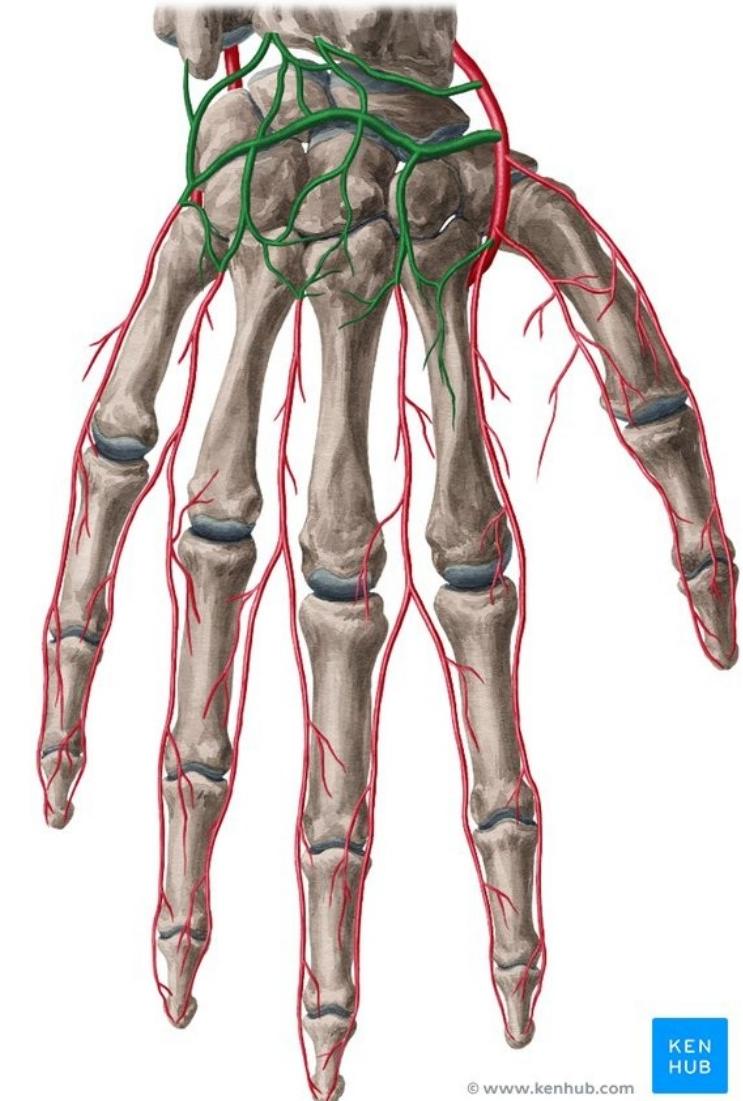


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Vascular concepts

**Via
the **palmar**
& **dorsal**
carpal
arch which
are derived
from the
radial and
ulnar
arteries.**

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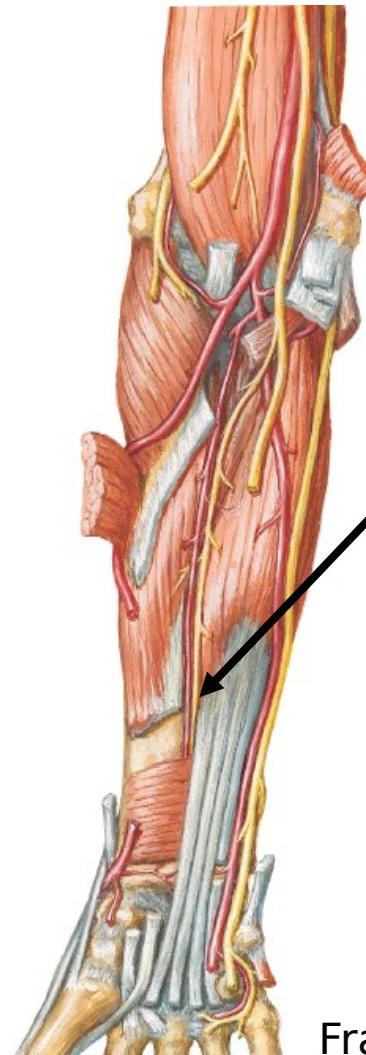
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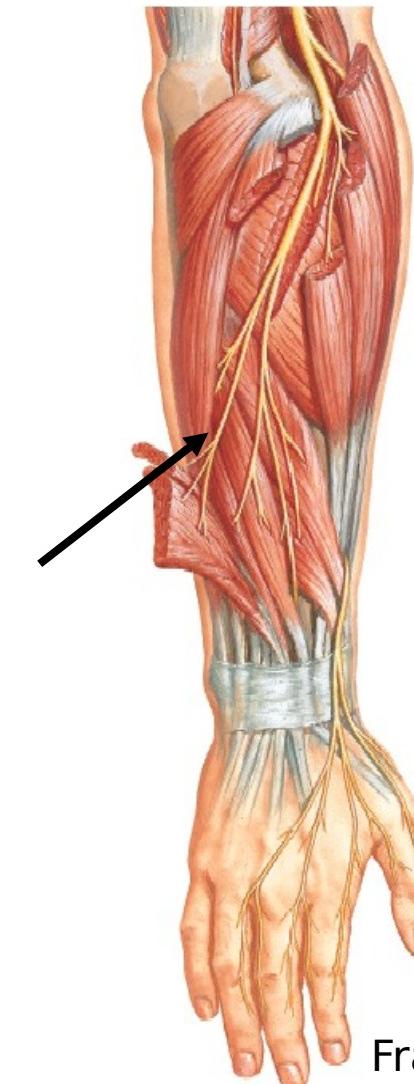


Nerve supply



- 1)Anterior
interosseous nerve.**
- 2)Posterior
interosseous nerve.**

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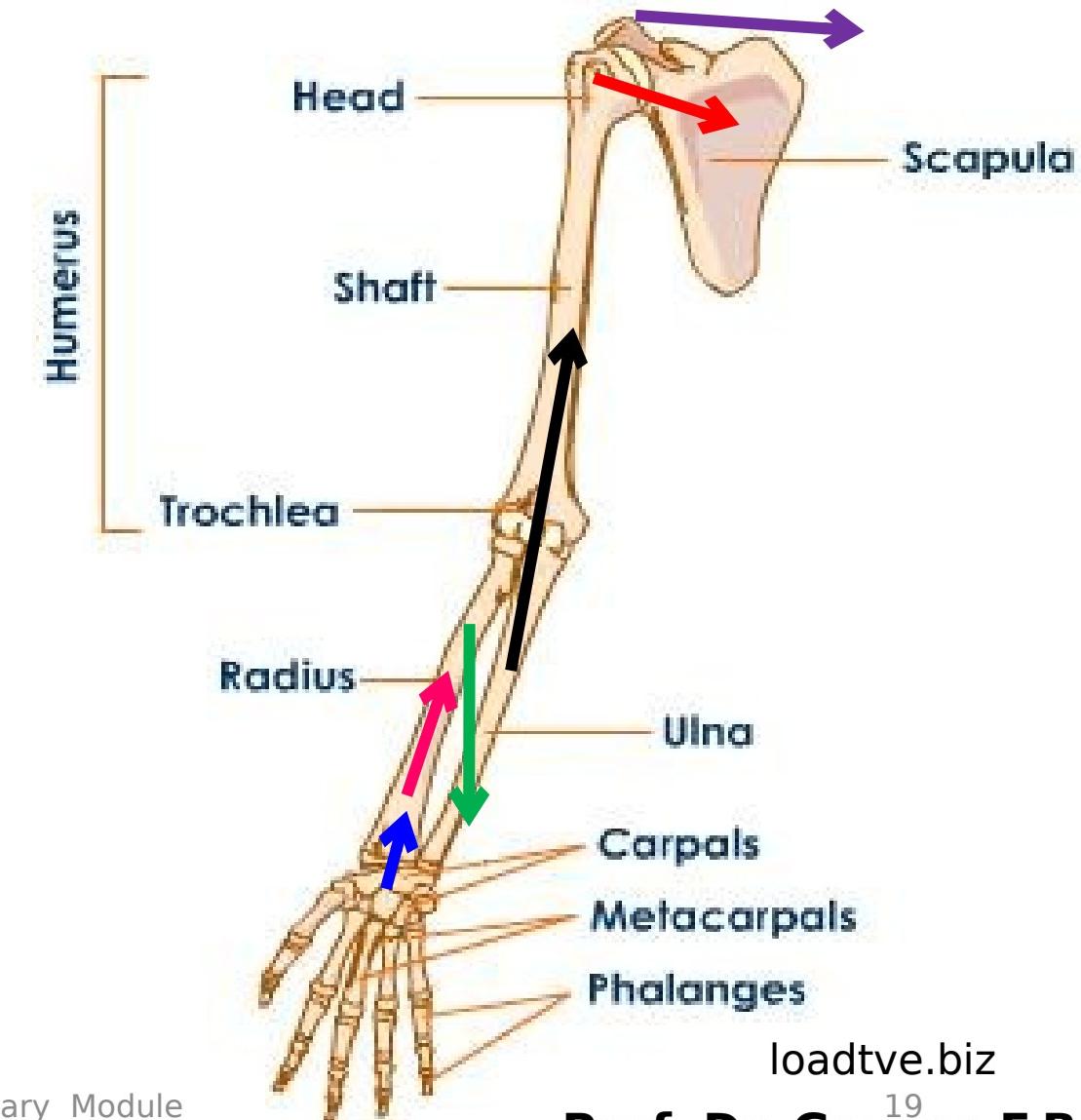


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Clinically important points of wrist joint



- Fall on outstretched hands, forces are transmitted from the **scaphoid** → **distal end of the radius** → **across the interosseous membrane** → **ulna** → **humerus** → **glenoid fossa of the scapula** → **coracoclavicular ligament** → **clavicle** → **sternum**.



Relax, if you can



Joints of Hand

All hand joints are plane except 3



Intercarpal :

Midcarpal J.: Plane between proximal & distal rows

Carpo-metacarpal:

- 1- of the thumb (**saddle**).
- 2- of the rest fingers (**plane**).

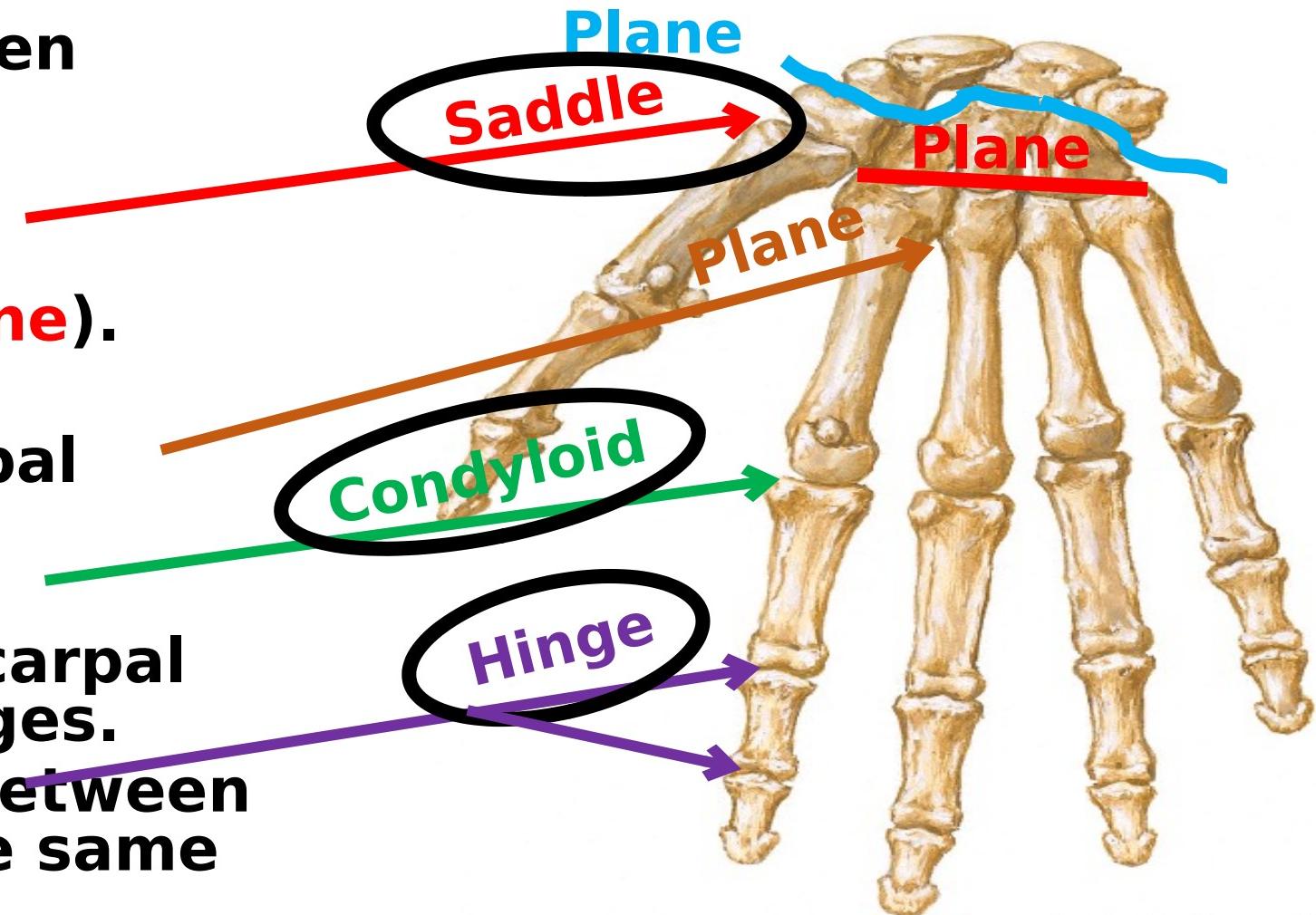
Inter-metacarpal:

Plane between metacarpal bones No. 2, 3, 4, 5.

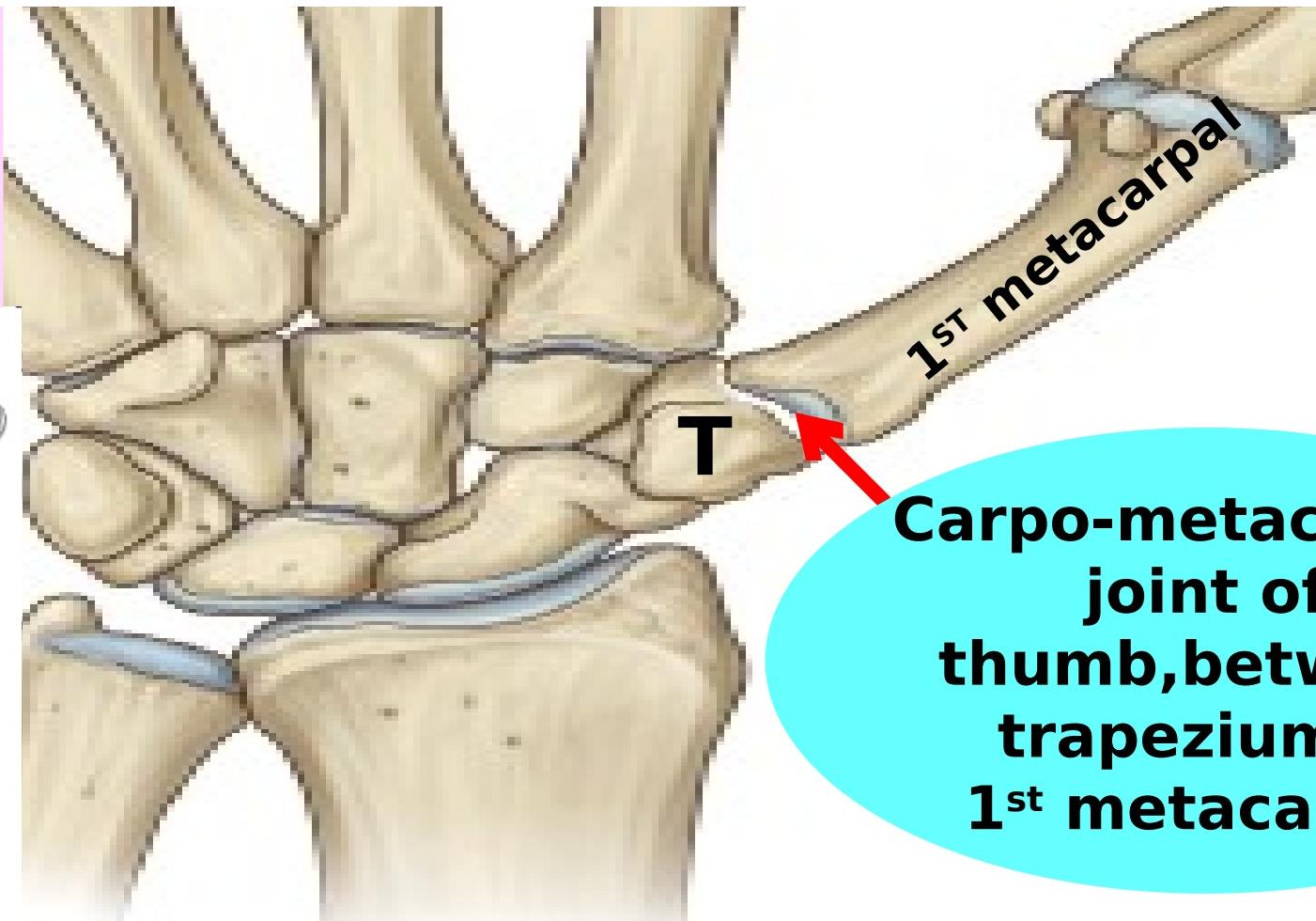
Metacarpo-phalangeal:

Condyloid between metacarpal bones & proximal phalanges.

Interphalangeal: Hinge between adjacent phalanges of the same finger.



SADDLE JOINT



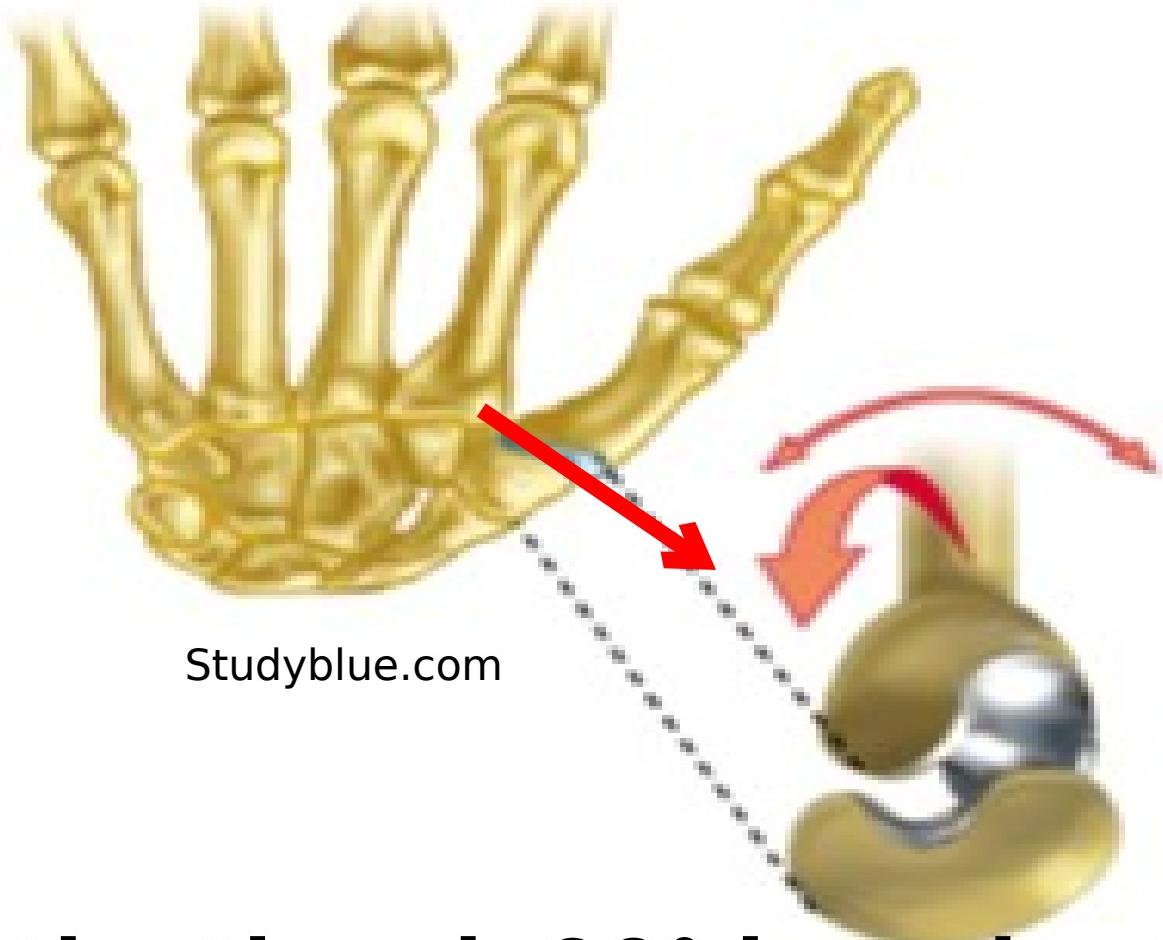
**Carpo-metacarpal
joint of
thumb,between
trapezium &
1st metacarpal**

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If you have a thumb, you'll have a hand

SADDLE JOINT

Carpo-metacarpal joint of thumb, between trapezium & 1st metacarpal

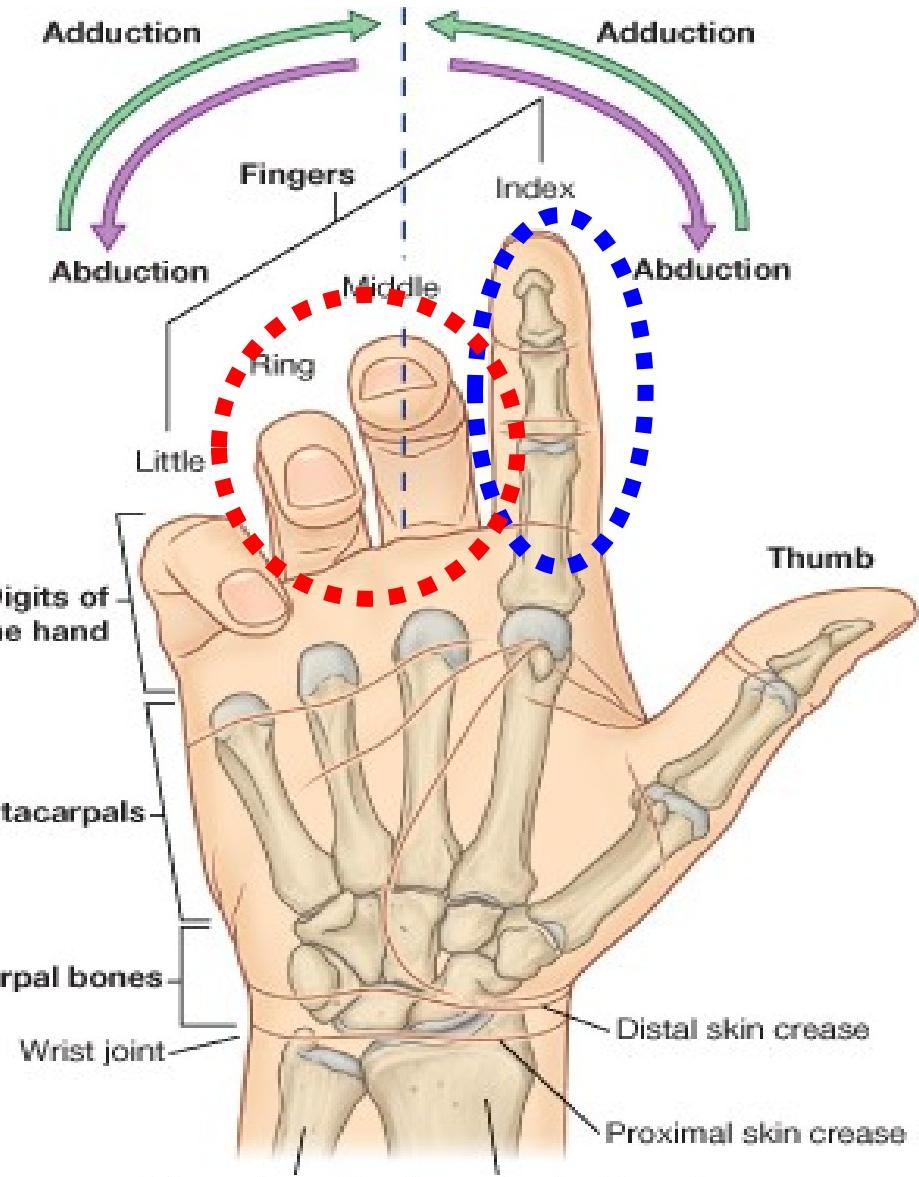


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This mediately rotates the thumb 90° in order to oppose other fingers

- **Movements of the med. 4 Fingers:**

- 1) **Flexion** (fingers perpendicular to palm)
- 2) **Extension** (fingers in same plane with palm)
- 3) **Adduction** (towards middle finger)
- 4) **Abduction** (away from middle finger)



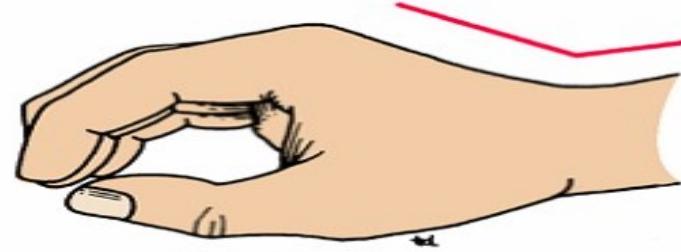
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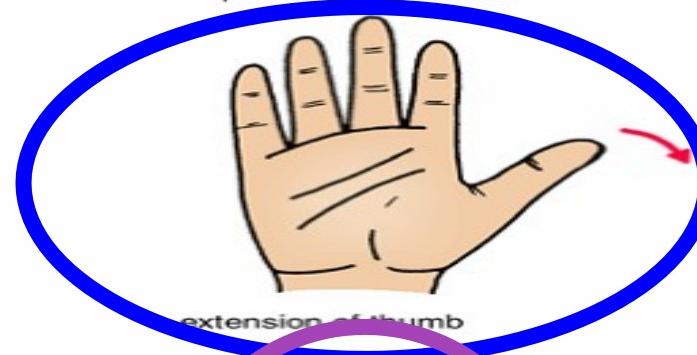
position of rest



flexion of thumb



position of function



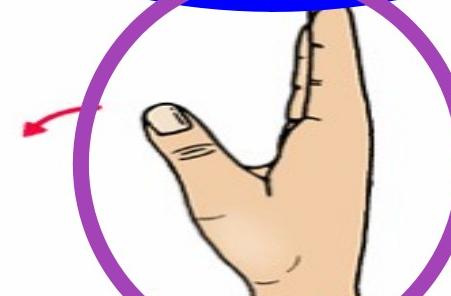
extension of thumb



abduction of thumb



adduction of thumb



opposition of thumb

Ms. performing these actions are named according to their function e.g. adductor pollicis.

Snell's clinical anatomy

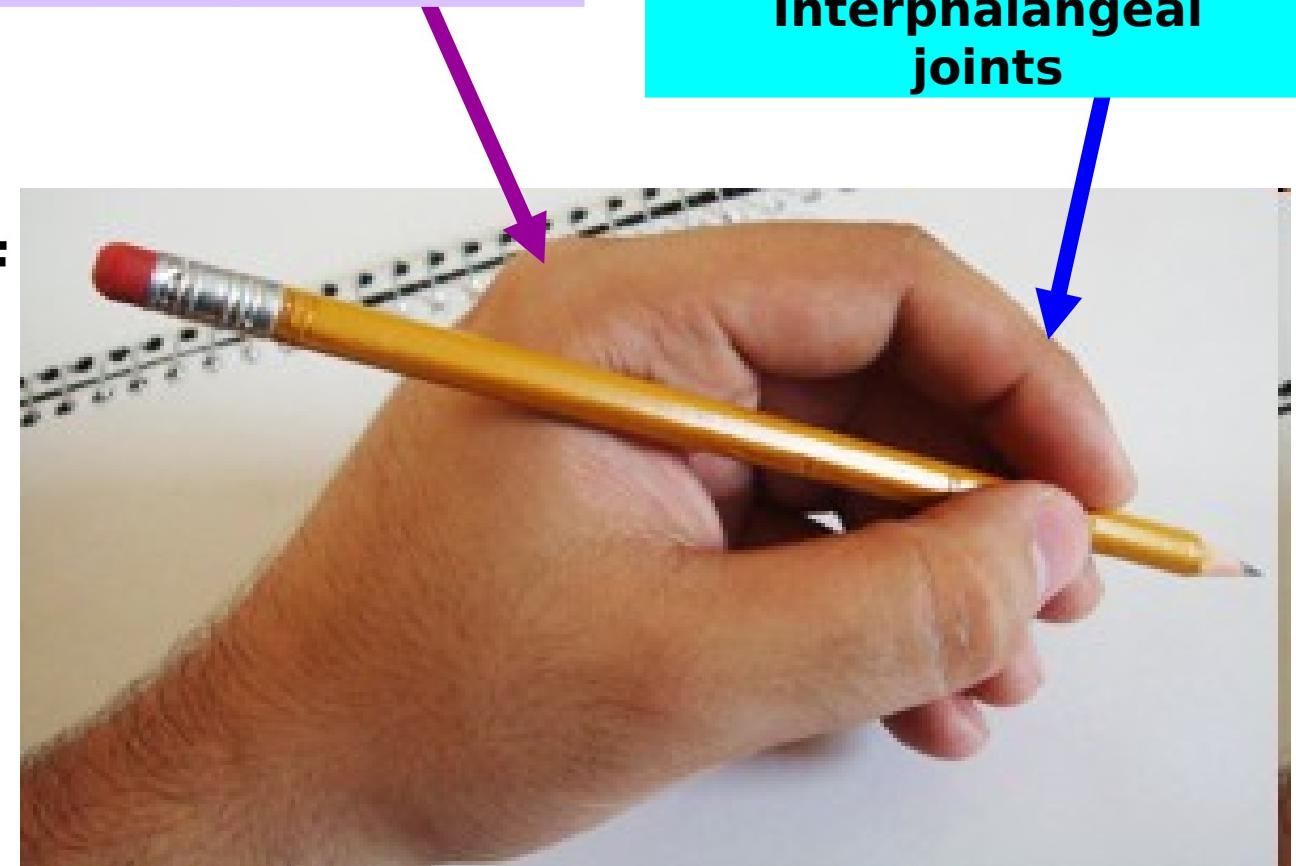
by revision, 9th ed.

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Flexion of metacarpo-phalangeal joint

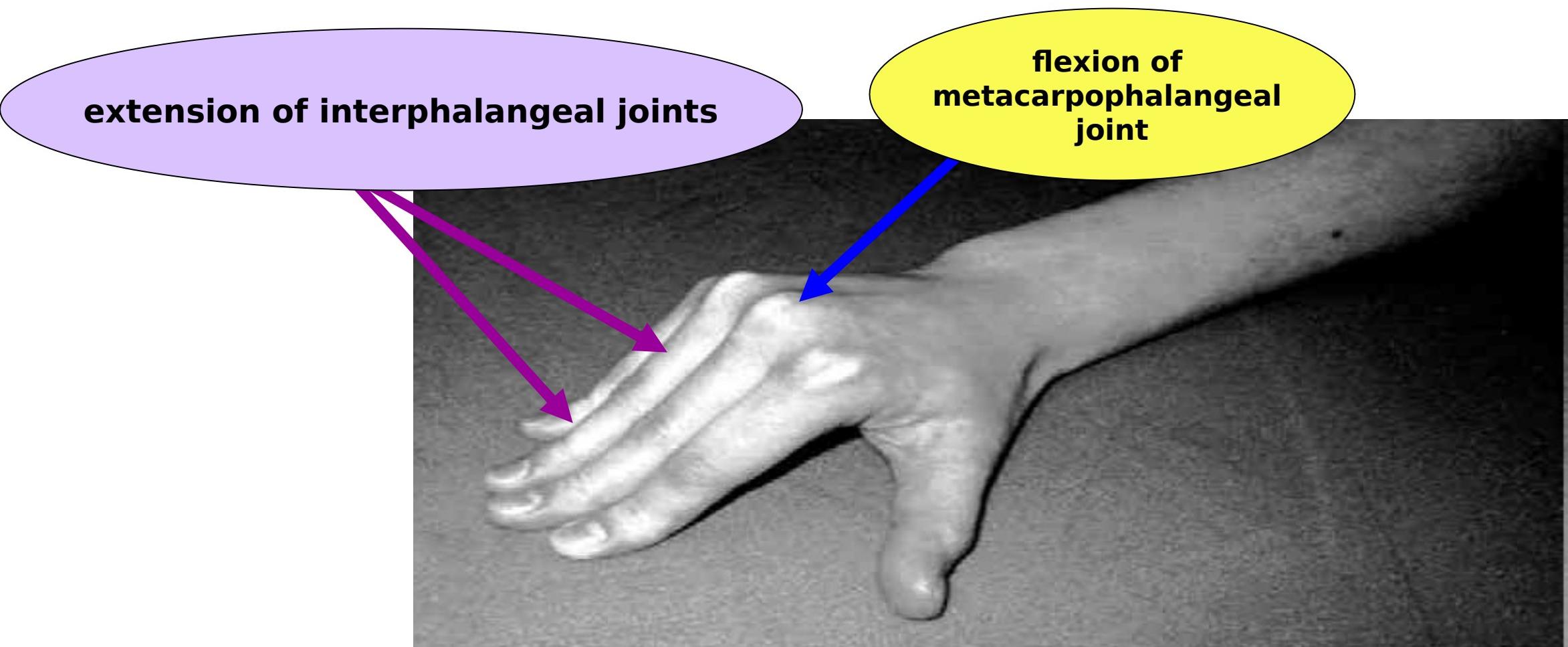
Extension of Interphalangeal joints

- **Lumbricals & interossei, put the fingers in the writing position (flexion of metacarpo-phalangeal joints & extension of interphalangeal joints)**





The writing position



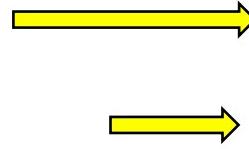
Try to imagine what happens if lumbricals & interossei are paralyzed



Writing position

Flexion of metacarpo-phalangeal joints
Extension of inter-phalangeal joints

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Claw hand (ulnar N. injury)

Extension of metacarpo-phalangeal joints
Flexion of inter-phalangeal joints

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Lecture Quiz



During a street fight, a 15-years-old male teen sustained a cut wound that injured his left ulnar nerve. As a result, he developed paralysis of his lumbricals & interossei muscles. Which of the following movements would be affected in the patient?

- A. Flexion of the carpo-metacarpal joints.
- B. Extension of the carpo-metacarpal joints.
- C. Flexion of the metacarpo-phalangeal joints.
- D. Extension of the metacarpo-phalangeal joints.

Lecture Quiz Answer



During a street fight, a 15-years-old male teen sustained a cut wound that injured his left ulnar nerve. As a result, he developed paralysis of his lumbricals & interossei muscles. Which of the following movements would be affected in the patient?

- A. Flexion of the carpo-metacarpal joints.
- B. Extension of the carpo-metacarpal joints.
- C. **Flexion of the metacarpo-phalangeal joints.**
- D. Extension of the metacarpo-phalangeal joints.

SUGGESTED TEXTBOOKS



Snell Clinical Anatomy by regions 9th edition, p. 411- 414 & figures 9.77, 9.78 in page 414.



The End